

**WASHINGTON DEPARTMENT OF ECOLOGY**  
**ENVIRONMENTAL ASSESSMENT PROGRAM**  
**FRESHWATER MONITORING UNIT**  
**STREAM DISCHARGE TECHNICAL NOTES**

**STATION ID:** 40A070  
**STATION NAME:** Squilchuck Creen below Picher Canyon  
**WATER YEAR:** 2012  
**AUTHOR:** Michael S. Anderson

**Introduction**

Watershed Description

Squilchuck Creek is a tributary of the Columbia River, located south of the city of Wenatchee, Washington. The drainage extends from the Columbia River to Mission Ridge (elevation 6,280 feet), and is bounded by Dry Creek to the north and Stemilt Creek to the south. The upper Squilchuck basin is predominantly forested and includes the Mission Ridge ski area and Squilchuck State Park. The lower portion of the basin is mostly undeveloped shrub-steppe with some residential and agricultural development along the stream corridor. Annual precipitation averages 20.8 inches, with a substantial portion falling in the upper basin as snow. Snow-making operations are conducted at the ski resort.

Gage Location

The Squilchuck Creek below Pitcher Canyon stream gage is located on the left bank of Squilchuck Creek off Squilchuck Road above the Lovitt Tailings Pond (inactive) at RM 2.0. At this location, the stream channel is a lined with concrete.

Table 1.

|                                       |                |
|---------------------------------------|----------------|
| Drainage Area (square miles)          | 26.43          |
| Latitude (degrees, minutes, seconds)  | 47° 22' 42" N  |
| Longitude (degrees, minutes, seconds) | 120° 18' 51" W |

## Discharge

Table 2. Discharge Statistics.

|   |      |
|---|------|
| Mean Annual Discharge (cfs)                               | 7    |
| Median Annual Discharge (cfs)                             | 4.7  |
| Maximum Daily Mean Discharge (cfs)                        | 31   |
| Minimum Daily Mean Discharge (cfs)                        | 0.70 |
| Maximum Instantaneous Discharge (cfs)                     | 34   |
| Minimum Instantaneous Discharge (cfs)                     | 0.60 |
| Discharge Equaled or Exceeded 10 % of Recorded Time (cfs) | 18   |
| Discharge Equaled or Exceeded 90 % of Recorded Time (cfs) | 2    |
| Number of Days Discharge is Greater Than Range of Ratings | 0    |
| Number of Days Discharge is Less Than Range of Ratings    | 0    |

Note: Statistics displayed in Table 2 may not include values in which the predicted discharge exceeds the range of ratings.

## Narrative

In water year 2011, eight discharge measurements were conducted at a range of flows from 1.4 cfs to 20 cfs. The channel was ice-impacted intermittently throughout the winter season. Peak discharges occurred in late April as snow melted in the upper portions of the basin; low flows were observed in late August.

## Error Analysis

Table 3. Error Analysis Summary.

|  |       |
|--|-------|
| Logger Drift Error (% of discharge)    | 28.5% |
| Weighted Rating Error (% of discharge) | 9.7%  |
| Total Potential Error (% of discharge) | 38.2% |

## Rating Table(s)

Table 4. Rating Table Summary

|                              |                     |                    |                     |
|------------------------------|---------------------|--------------------|---------------------|
| Rating Table No.             | 205                 | 305                | 206                 |
| Period of Ratings            | 10/1/2011-2/22/2012 | 2/21/2012-5/7/2012 | 4/26/2012-9/30/2012 |
| Range of Ratings (cfs)       | 0.31 to 64.6        | 0.93-64.6          | 0.31 to 64.6        |
| No. of Defining Measurements | 18                  | 12                 | 18                  |
| Rating Error (%)             | 10.8                | 8.6                | 10.8                |

|                              |  |  |  |
|------------------------------|--|--|--|
| Rating Table No.             |  |  |  |
| Period of Ratings            |  |  |  |
| Range of Ratings (cfs)       |  |  |  |
| No. of Defining Measurements |  |  |  |
| Rating Error (%)             |  |  |  |

|                              |  |  |  |
|------------------------------|--|--|--|
| Rating Table No.             |  |  |  |
| Period of Ratings            |  |  |  |
| Range of Ratings (cfs)       |  |  |  |
| No. of Defining Measurements |  |  |  |
| Rating Error (%)             |  |  |  |

## Narrative

Water year 2011 began in a period of phased transition between Rating Table #205 and Rating Table #305. Over the course of the year, the rating shifted back and forth between an upper and a lower rating. Shifts in the rating appear to be driven by the accumulation and flushing of debris from behind the pipe extending into the stream from the gaging station. In some cases, these shifts could be tied to specific events, but in other cases there was no definitive evidence in the record of when a shift occurred. It is likely that shifting occurred more frequently during some portions of the water year than it was possible to account for because the shifts were more frequent than field observations. The uncertainty associated with frequent shifting is likely a major contributor to the total potential error

## Stage Record

Table 5. Stage Record Summary

|  |      |
|--|------|
| Minimum Recorded Stage (feet)                    | 4.63 |
| Maximum Recorded Stage (feet)                    | 5.88 |
| Range of Recorded Stage (feet)                   | 1.25 |
| Number of Un-Reported Days                       | 37   |
| Number of Days Qualified as Estimates            | 246  |
| Number of Days Qualified as Unreliable Estimates | 0    |

## Narrative

Thirty-seven days were not reported because the channel was ice-impacted and the stage-discharge relationship was not valid.

Of the 246 days qualified as estimates, 139 were identified as estimates and 55 as questionable estimates by drift analysis. The remainder of the estimated days were between periods of ice-impacted data and the next ice-free stage observation.

Strong sensitivity drift was detected in the stage record, and a correction was applied to the entire stage record prior to error analysis. It is likely this adjustment contributed to the high potential error in this water year.

## Modeled Discharge

Table 6. Model Summary

|  |      |
|--|------|
| Model Type (Slope conveyance, other, none) | None |
| Range of Modeled Stage (feet)              | n/a  |
| Range of Modeled Discharge (cfs)           | n/a  |
| Valid Period for Model                     | n/a  |
| Model Confidence                           | n/a  |

## Surveys

Table 7. Survey Type and Date (station, cross section, longitudinal)

| Type | Date |
|------|------|
| None | N/A  |

## Activities Completed

Station was decommissioned on September 27, 2012, due to budget reduction.